



George C. Marshall Space Flight Center
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BASELINE
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FACILITY OPERATING PROCEDURE

**ED27 / MODAL AND CONTROL
DYNAMICS TEAM**

PCB MULTI-CHANNEL ACCELEROMETER SYSTEM SETUP AND CALIBRATION FOR MODAL SURVEYS

**CHECK THE MASTER LIST—
VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE**

ED27 / Modal and Control Dynamics Team		
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DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		7/28/99	Document converted from ED73-EMA-FOP-002 due to reorganization. Previous history retained in system as part of canceled Group files. Revised entire document to reflect the new organizational structure and document numbering system.

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INTRODUCTION

- 1.1 Scope This procedure defines the system used to setup and calibrate PCB Model 330 and 333 accelerometers used in the performance of experimental modal analysis and testing.
- 1.2 Purpose This procedure defines the system to fulfill the requirements of ED27-OWI-M&V-002 "Quality Records Control".
- 1.3 Applicability This procedure applies to the PCB Model 330 and 333 accelerometers used in the performance of experimental modal analysis and testing within the Modal and Control Dynamics Team/ED27.

2. REFERENCE DOCUMENTS

ED27-OWI-M&V-002	Quality Records Control
ED27-EMA-FOP-001	Mounting of PCB Triaxial Adaptor for Modal Surveys.
ED27-EMA-FOP-008	Cabling Schematics for the HP9000 Computers with HP3565 Front-Ends for Modal Survey Testing.
ED27-EMA-FOP-009	Calibration of PCB Model 333 Accelerometers Used for Modal survey Testing.

3. DEFINITIONS

- 3.1 Accelerometer Calibration System The test equipment known as the "Accelerometer Calibration System" is composed of the following components.
 - 3.1.1 Signal Conditioners Consists of one or more instruments which provide a power source to the transducer and provide amplification of the output signal.
 - 3.1.2 Hand-Held Calibration Exciter PCB Model 394B05 Provides a constant acceleration level at a constant frequency to the attached transducer. The Hand-Held Calibration Exciter is considered to be Category I test equipment (Mandatory Calibration and Recall).
 - 3.1.3 Personal Computer with Calibration Software Installed May be any Intel x86 based computer with a GPIB (IEEE 488) interface card and Accelerometer Calibration Software installed.
 - 3.1.4 Bar Code Scanner Connected to the computer(3.1.3) and used to scan the bar codes affixed to the PCB Model 333 accelerometers.
- 3.2 Auxiliary Equipment Describes any other equipment used in the calibration process that is not part of the Accelerometer Calibration System and includes the following components.
 - 3.2.1 Cabling and Patch Panels Provides the interface between the accelerometer under calibration and the Signal Conditioner.

4. INSTRUCTIONS

- 4.1 Setup Prior to setup, the number of currently available PCB Model 333 accelerometers should be determined and compared against the number of accelerometers needed for the test. If there is a

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sufficient quantity of Model 333 transducers, then none of the older Model 330s will need to be used.

- 4.1.1 At a location convenient to the test article, setup a personal computer with the accelerometer setup/calibration software installed.
- 4.1.2 Mount the PCB Model 070C21 patch panels on a table adjacent to the test article. The patch panels should be identified and labeled by set (ie. A1,A2,A3,B1,B2,B3...). Connect the patch panels to the data acquisition system using the ribbon cables.
- 4.1.3 Connect the Bar Code Reader to the PC using the supplied cable.
- 4.1.4 If any Model 330 accelerometers will be used in the test (see section 4.1), locate a PCB Model 394B05 hand-held calibrator, verify proper operation, and place on the table adjacent to the PC. The PC should be connected to either a Keithley Model 2000 or 193 voltmeter by connecting a standard GPIB(IEEE488) interface cable between the PC and the voltmeter.
- 4.1.5 Place a supply of accelerometers, accelerometer cables and mounting blocks convenient to the work area.
- 4.1.6 Start the Calibration Software program on the PC and verify operation with/connection to the voltmeter (if used).
- 4.1.7 The following steps will be determined by which model accelerometer is being installed on the test article.

4.2 Calibration/installation of Model 330 Accelerometers

- 4.2.1 Unspool and plug a 9-wire, 50 ft. tri-axial cable Model 080A38 into the next available socket in the set of patch panels.
- 4.2.2 Attach the first (X direction) mounting socket of the tri-axial cable to the jumper cable of the hand-held calibrator. Install a Model 330 accelerometer onto the hand-held calibrator and verify continuity by checking that the appropriate channel light is unlit at the signal conditioner.
- 4.2.3 Using a BNC connector, connect the output of the signal conditioner (at the break-out panel of the Data Harvester) to the voltmeter.
- 4.2.4 Enter the channel number, accelerometer serial number, point number and direction into the calibration software. Click on the "Read Meter" button to read the voltage and transfer the calibration data into the database.
- 4.2.5 Repeat sections 4.2.2 - 4.2.4 for the 2nd (Y direction) and 3rd (Z direction) sockets of the triaxial cable.
- ~~4.2.2~~ 4.2.6 Repeat section 4.2 for each Model 330 accelerometer.

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4.3 Calibration/installation of Model 333 Accelerometers

4.3.1 Unspool and plug a 9-wire, 50 ft. tri-axial cable Model 080A38 into the next available socket in the set of patch panels.

4.3.2 Configure the calibration software to use the accelerometer calibration database and set up for the first channel. Scan the bar code affixed to a Model 333 accelerometer which will record the serial number and extract the calibration constant from the database. Use the calibration software to record the test point number and direction for this accelerometer. Repeat section 4.3.2 for the remaining 2 accelerometers for this triaxial cable.

4.3.3 Repeat section 4.3.1 for each triaxial measurement point on the structure.

5. QUALITY RECORDS

5.1 Accelerometer Calibration Database The following information will be recorded in the accelerometer calibration electronic database: Model number and serial number of all accelerometers, point number at which the accelerometer was located on the structure under test and the calibration constant in g/Volt.